

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of)
)
CARRIER CURRENT SYSTEMS) ET Docket No. 03-104
INCLUDING BROADBAND OVER POWER)
LINE SYSTEMS)
)
AMENDMENT OF PART 15 REGARDING) ET Docket No. 04-37
NEW REQUIREMENTS AND)
MEASUREMENT GUIDELINES FOR)
ACCESS BROADBAND OVER POWER LINE)
SYSTEMS)

To: The Commission

COMMENTS OF KING-FISHER COMPANY
A MANUFACTURER OF WIRELESS FIRE ALARM CALL BOXES

King-Fisher Company, a manufacturer of wireless fire alarm call boxes, hereby respectfully submits its comments in response to the *Notice of Proposed Rule Making* (the Notice), FCC 04-29, released February 23, 2004, 69 Fed. Reg.12612 *et seq.* The Notice proposes to amend Part 15 of the Commission's rules governing unlicensed radio frequency (RF) devices to adopt new requirements and measurement guidelines for carrier current systems that provide access to broadband services using electric utilities' power lines, known as Access Broadband Over Power Line (Access BPL) technology. These comments are timely filed. For its comments, King-Fisher Company states as follows.

I. Introduction

1. King-Fisher Company manufactures radio call boxes for public fire departments. We support and concur with the arguments put forth by the International Municipal Signal

Association regarding the potential for interference with radio call boxes by active BPL systems.¹

2. Radio call boxes manufactured by King-Fisher conform to the requirements set forth in 47CFR90.241(a). The regulations in this section specify the maximum transmitter power output (1 watt), antenna gain (0 dBd) and height (20 feet) that a radio call box may have.² This translates to maximum ERP of 1 watt, which is often somewhat smaller due to variable feed line losses.
3. To date, King-Fisher Company has installed thousands of such call boxes that generate fire alarms for numerous public fire departments. King-Fisher Company radio call boxes operate over a maximum distance of approximately 20 miles. The conditions specified in § 90.241(a) coupled with transmission over this distance result in minimum signal strength at the receiving antenna of -150 dBW.
4. Radio call boxes manufactured by King-Fisher Company report their positions to fire stations using A2D modulation in a series of tones with a total duration between 300 and 600 msec. Position reports are repeated two times during a 30 second interval.

II. Why We Believe Access BPL, As Proposed, Will Cause Harmful Interference to Radio Call Boxes and Endanger Public Safety

5. Since King-Fisher Company radio call boxes are installed at community fire departments around the United States, it is reasonable to expect that call box receivers will be located in close proximity to medium voltage power lines carrying Access BPL signals.

¹ Comments of IMSA, the International Municipal Signal Association in response to the Notice of Proposed Rule Making, FCC 04-29, released February 23, 2004, 69 Fed. Reg.12612 *et seq.*

² 47CFR § 90.241 Radio call box operations.

6. Access BPL systems, with a stated frequency range of 1.7-80 MHz, generate carriers that overlap frequencies that have been assigned for radio call box operation.
7. We do not expect that adaptive interference avoidance by Access BPL systems will be effective. It would be nearly impossible for an adaptive system to detect a very weak carrier that consists of three short signal bursts lasting hundreds of msec that occur only once a day and during active fire alarms.
8. In the comments of the American Radio Relay League³, signal strengths from active Access BPL systems were measured to be as high as 37.1 dB_{μV/m} at a distance of 30 meters from medium voltage power lines containing BPL signals. This level of interference would clearly be harmful to the successful transmission of fire alarm location signals.
9. In the tests performed on Access BPL systems by the NTIA⁴, signal strengths from BPL systems were measured to be as high as -90 dBW at a straight-line distance of 70 meters. This level of interference is far higher than the levels received at many call box receivers, as discussed below in paragraph 14.
10. Many of the Access BPL systems currently being tested use carrier frequencies that range from 1.7-30 MHz. While this would not appear to conflict with the 72-76 MHz frequency band used by radio call boxes, call boxes are likely to receive harmful interference from the third harmonics of BPL signals in the 24-25.3 MHz region.

³ Comments of ARRL, the National Association for Amateur Radio, in response to the Notice of Proposed Rule Making, FCC 04-29, released February 23, 2004, 69 Fed. Reg. 12612 *et seq.*

⁴ NTIA Report 04-413 ("NTIA Report") at Appendix D
See <http://www.ntia.doc.gov/ntiahome/fccfilings/2004/bpl/index.html>.

11. The Commission has proposed an interference mitigation technique in the Notice by which the licensed service notifies the Access BPL provider of the presence of harmful interference after which the Access BPL provider ceases operation on the affected frequency carriers. We find this solution to be wholly untenable when applied to such critical public safety devices as wireless fire alarms. We can foresee a situation in which a public fire department will not recognize fire alarm failure due to harmful interference and fail to notify the Access BPL provider of the potential for a problem, resulting in missed fire alarms and increased danger to the public.

III. Requirements for Limiting BPL Emissions That Would Allow BPL to Coexist with Wireless Call Boxes

12. Based on the typical signals strengths that must be received without error in order to provide reliable call box operation, we have calculated the conditions under which BPL must operate with respect to RF emissions from power lines.

13. Our calculations are conservatively based on the following assumptions:

- a. We are concerned with emissions in the 72-76 MHz band that are the sum of fundamental carriers (for BPL systems that operate in that region of the spectrum) plus all intermodulation products (including harmonics) from all lower frequency carriers modulated on the power lines⁵.
- b. The average distance of call box receiving antennas from power lines carrying BPL signals is 10 meters⁶.
- c. The receiving bandwidth is 25 kHz.

⁵ We note that power lines are highly nonlinear devices at RF. Thus, there is a great likelihood of generation of a complex combination of intermodulation products at higher frequencies.

⁶ While it would appear to be an easy mitigation of BPL interference to move receiving antennas away from power lines, this solution would have limited utility. A community fire department often has limited space to mount antennas. This particular antenna must have line-of-sight to all of the call box transmitters in the community. Additionally, it must not be placed close to any of the high power communication antennas used by the department.

- d. The maximum acceptable noise will produce 1-dB degradation in the received call box signal.
14. For a minimum call box signal at the receiving antenna of -150 dBW, the noise power at the antenna that will result in a 1-dB degradation of the 25 kHz-wide signal is -156 dBW.
15. Scaling the 10-meter distance between the receiving antenna and the power line to the standard 3-meter measurement distance and the 25-kHz receiver bandwidth to the standard 100-kHz measurement bandwidth⁷ results in a maximum allowable measured BPL signal density of -7.5 dB μ V/m in the vicinity of a fire station containing a wireless call box receiver.

IV. Conclusions

16. With thousands of radio call boxes in active use by fire departments across the United States, the relatively weak signals in the 72-76 MHz band have become an indispensable part of public safety maintenance.
17. The regulatory power and antenna gain and height limits for radio call boxes result in weak signals that are susceptible to even low levels of noise interference.
18. The low duty cycles and infrequent use of frequencies that must be kept clear at all times in case of the need for a fire alarm make it highly unlikely that adaptive interference avoidance techniques by other communications systems will be effective.
19. The nonlinear properties of power lines at RF make intermodulation products, including harmonics, of BPL carriers an interference concern. Notching out the appropriate frequencies to prevent harmful interference is not expected to be a simple procedure.

⁷ 47CFR Part 15.209 Radiated emission limits, general requirements.

(a) Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table (*excerpted*):

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 – 88	100	3

20. The likelihood of recognition of an interference problem by fire department personnel is low, making interference avoidance by notching out the active frequencies of the radio call boxes an unlikely occurrence.

21. Based on our conservative calculations, BPL emissions from the fundamental carriers *and all intermodulation products* in the 72-76 MHz band emanating from power lines in the vicinity of a fire station must be reduced by 47.5 dB below the allowable Part 15 limits in order for the two technologies to coexist.

It is for these reasons that King-Fisher Company believes that Access BPL as proposed will create a risk to public safety in communities across the United States. We respectfully request that the Commission enact additional rules that help to guarantee the integrity of radio call box signals by severely limiting the potential for Access Broadband over Power Lines to generate harmful interference to this type of public safety communications signal.

Respectfully submitted,

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